PEACE/WILLISTON
FISH & WILDLIFE
COMPENSATION
PROGRAM

BC hydro

BRITISH
COLUMBIA

A Reconnaissance Survey Of Rainbow Lake

K. Mathias
March 1997

PWFWCP Report No. 155

The Peace/Williston Fish & Wildlife Compensation Program is a cooperative venture of BC Hydro and the provincial fish and wildlife management agencies, supported by funding from BC Hydro. The Program was established to enhance and protect fish and wildlife resources affected by the construction of the W.A.C. Bennett and Peace Canyon dams on the Peace River, and the subsequent creation of the Williston and Dinosaur Reservoirs.

Peace/Williston Fish and Wildlife Compensation Program, 1011 Fourth Ave. 3rd Floor, Prince George B.C. V2L 3H9

Website: *www.bchydro.bc.ca/environment/initiatives/pwcp/*

This report has been approved by the Peace/Williston Fish and Wildlife Compensation Program Fish Technical Committee.

Citation: K. Mathias. March 1997. A reconnaissance survey of Rainbow Lake. Peace/Williston Fish and Wildlife Compensation Program, Report No. 155. 22pp plus appendices.

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105-02097/

A RECONNAISSANCE SURVEY OF

UNNAMED LAKE (RAINBOW LAKE)

WATERSHED:	**Finlay River**
DATE OF SURVEY:	**August 11-12,1996**
FIELD CREW LEADER:	**Mark Hunter**
FIELD ASSISTANT:	**Karin Mathias**
REPORT PREPARED BY:	**Karin Mathias**
REPORT EDITTED BY:	**Mark Hunter**

BRITISH COLUMBIA CONSERVATION FOUNDATION

PEACE / WILLISTON FISH AND WILDLIFE COMPENSATION PROGRAM

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

FUNDED BY: FOREST RENEWAL BRITISH COLUMBIA

RELEASED BY: _____

D. J. Cadden, Regional Fisheries Biologist

LAKE: Unnamed Lake (Rainbow Lake) SYSTEM NAME: Finlay River

A.S.A.P. REFERENCE NO.: **WATERSHED CODE: 239-3730-187-442**

DATA ON FILE FOR THIS SURVEY

Location	X	Dissolved 02 / Temp. Profiles	X
Physical Data	X	Winter Dissolved 02 / Temp. Profiles	--
Bench Mark	X	Netting Record	X
Terrain Features	X	Lake Catch Summary	X
Access	X	Individual Fish Data	X
Resorts and Campsites	X	Fish Preserved	--
Other Developments	X	Stomach Analysis	X
Obstructions and Pollutions	X	Scale Reading	X
Special Restrictions	X	Location of Inventory Sites	X
Aquatic Plants	X	Photograph Directory	X
Wildlife Observations	X	Appendices	
Miscellaneous Comments	X	A: Water Chemistry Analysis	X
Lake Drainage	X	B: Tributary Stream Data	X
Fisheries Management Comments	X	C: Fish Scale Analysis	X
History of Previous Surveys	X	Bathymetric Map Reduction	X
Water Chemistry Summary	X	Bathymetric Map	--

LOCATION

Location:	approximately 13 km west-southwest of Fort Ware		
Elevation:	870 m ± 10 m	U.T.M.:	10.331086.6362710
Latitude / Longitude:	57°22'33" 125°48'34°	N.T.S. Map No.:	94 F/5 edition 1
Management Unit:	7-40	Biogeoclimatic Zone:	Boreal White & Black Spruce
Ecoprovince:	Sub-Boreal Interior	Ecoregion:	Northern Canadian Rocky Mountains
Ecosection:	Cassiar Ranges		

Drainage: Unnamed C. --> Unnamed L. --> Unnamed C. --> Finlay R. --> Williston Reservoir (Finlay Reach) --> Peace R.

PHYSICAL DATA

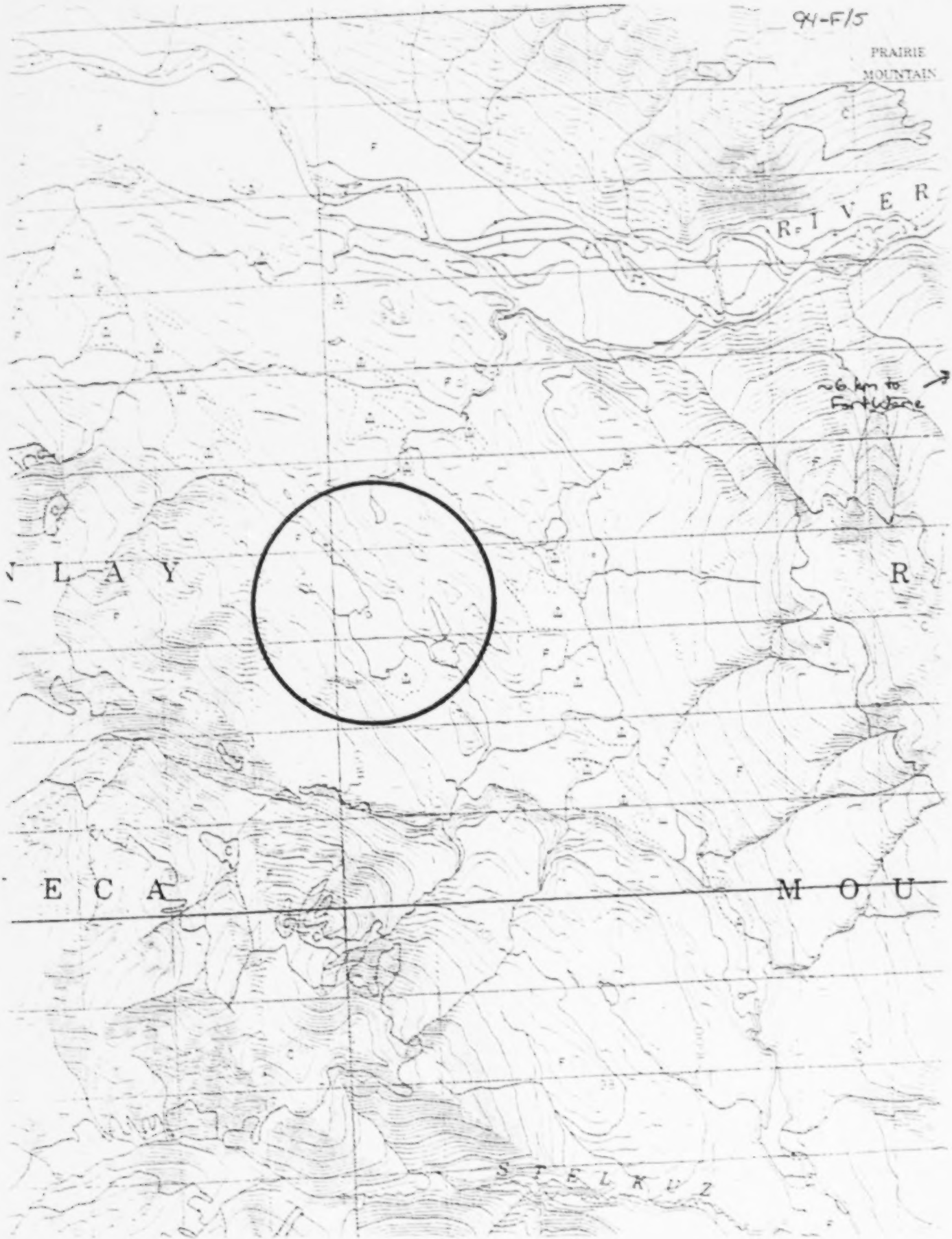
Lake Drainage Area:	10.1 km^2	Volume:	198 607 m^3
Water Surface Area:	149 146 m^2	Perimeter of Islands:	0 m
Area Above 6 m Contour:	142 288 m^2	Number of Islands:	0
Shoreline Perimeter:	3 097 m	Mean Depth:	1.4 m
Maximum Depth:	6.7 m	Secchi Reading:	4.8 m
Filterable Residue (TDS):	260 mg/L		

Sounding Device: Lowrance X-15 Elevation Source: Contour Interpolation

BENCHMARK

(Iron spike, center of red circle) located 2.0 m above present water level in a 27 cm diameter spruce tree that is 15.2 m from the present water's edge, and located on the northeast side of the lake, approximately 250 m southeast of Inlet # 1. Note: The benchmark is situated 25 cm above ground level (Plate #5).

High Water Mark: 0.05 m above water level at time of survey.


94-F/5
PRAIRIE
MOUNTAIN
R I V E R
~6 km to
Fort Nelson
L A Y
R
E C A
M O U
S T E L K U Z

LAKE: Unnamed Lake (Rainbow Lake)

TERRAIN FEATURES

Immediate Shoreline:

The shore of Rainbow Lake has a low slope on the north, south and west sides of the lake, and a moderate to moderately steep slope on the east side. Sedge grasses, with willow and alder growing behind, front the entire shoreline, with extensive growth on the west side of the lake as well as in the northwest bay. Willows and alder front the shoreline from the northwest to the northeast. A mixed forest of spruce, paper birch and lodgepole pine grows behind the riparian vegetation.

The shoreline substrate consisted of clay / mud fines along the south and west sides of the lake as well as in the east-southeast bay. The north and east shores consisted mainly of a cobble and gravel substrate over fines. An extensive bed of aquatic vegetation dominated by yellow waterlilies (Nuphar sp.) and variableleaf pondweed (Potamogeton gramineus) was growing in the northwest bay. The lake bottom drops off very slowly from most of the shoreline, with the exception of the north-northeast shore where the drop off is slightly steeper.

Surrounding Country:

Rainbow Lake is surrounded by a mature forest dominated by spruce and paper birch trees with lodgepole pine intermixed on the north and northeast sides of the lake. To the north and south of the lake, the immediate terrain's low slope changes to steeper hills, then low mountains in the far distance. In the eastern direction, the moderate slope of the immediate terrain becomes mountainous in the distance. To the west, the moderate slope becomes steep abruptly, and mountains are found in close proximity to the lake.
Rainbow Lake is situated within the Boreal White and Black Spruce biogeoclimatic zone.

LAKE: Unnamed Lake (Rainbow Lake)

ACCESS

Directions:

From the junction of Highway 97 and Highway 39, drive south on Highway 97 for approximately 1.5 km and turn right on to the Finlay Forest Service Road. Travel north for approximately 200 km to Mesilinka Camp, then continue on the Finlay-Chunamon Forest Service Road for approximately 105 km to the Ingenika Arm of Williston Reservoir. A barge must be taken across the Ingenika Arm. On the north side of the Ingenika Arm, drive north on the Finlay Forest Service Road for approximately 72.5 km. Turn left, and proceed for approximately 3.7 km to Buffalo Head Camp (Finbow Camp). The total distance from the junction of Highway 97 and Highway 39 to Buffalo Head Camp is approximately 382.7 km. Rainbow Lake is approximately a 25 km helicopter ride to the northwest of Buffalo Head Camp.

Barge transportation can be arranged with Finlay Navigation Inc. who can be reached in Prince George at (250) 964-3525 and in Mackenzie at (250) 997-3525. The barge transportation takes approximately 20 minutes. Actual barge pick-up times may vary greatly from the predicted pick-up time.

Road Type and Conditions:

Highway 97 is a well-maintained, two-lane paved highway. The Finlay Forest Service Road, on both sides of the Ingenika Arm, and the Finlay-Chunamon Forest Service Road from 0 km to approximately 79 km (Factor Ross Creek), are well-maintained, two-lane gravel logging roads that can be easily traveled with a two-wheel drive truck. After approximately 79 km, the Finlay-Chunamon Forest Service Road becomes quite narrow and very windy. The road in to Buffalo Head Camp from the Finlay Forest Service Road is a well-maintained, two-lane gravel road.

Restrictions:

Although there are no restrictions, it is recommended that a truck radio be used when traveling on all gravel roads.

RESORTS AND CAMPSITES

There were no resorts or campsites on Rainbow Lake.

LAKE: Unnamed Lake (Rainbow Lake)

OTHER DEVELOPMENTS

A small campsite with a fire pit was found on the northeast side of the lake close to the benchmark location. In addition, a small dock made of rough logs was located on the east side of the lake, approximately 150 m northwest of the outlet.

OBSTRUCTIONS AND POLLUTIONS

None noted.

SPECIAL RESTRICTIONS

None known.

AQUATIC PLANTS

The following aquatic plants were identified during the time of the survey:

waterweed (Anacharis sp.)
yellow waterlily (Nuphar sp.)
Chara sp.
Equisetum sp.
variableleaf pondweed (Potamogeton gramineus)

WILDLIFE OBSERVATIONS

The following wildlife or wildlife signs were seen during the time of the survey:

moose tracks and droppings
unidentified ducks (same species)
frog
bald eagle

MISCELLANEOUS COMMENTS

1) Bathymetric map: The lake outline was drawn from an enlargement of air photo 30 BCB 92081: No. 050, flown on June 2, 1994.

2) The drainage pattern for the outlet creek of Rainbow Lake shown on the N.T.S. map is incorrect. The outlet is shown on the N.T.S. map draining out of the south bay of the southeast arm of the lake, and flowing for approximately 0.6 km before joining an unnamed creek. The correct drainage pattern should show the outlet of Rainbow Lake draining out of the east bay of the southeast arm, and flowing for approximately 0.22 km before entering a small unnamed lake.

3) Many of the distances given in the directions to Rainbow Lake (in the Access section) have been taken from the Mackenzie South Forest District Recreation map and therefore are approximations only.

LAKE: Unnamed Lake (Rainbow Lake)

LAKE DRAINAGE

General:

Rainbow Lake is fed by four inlets and approximately 40 seasonal inlets. The lake is drained to the southeast by an unnamed creek that flows for approximately 2.2 km where it enters a small unnamed lake (the drainage pattern shown on the NTS map is incorrect). The outlet of the unnamed lake flows for about 2.0 km where it then joins another unnamed creek. This creek flows approximately 8.0 km to it's confluence with the Finlay River.

Major Systems:

There are no major systems.

Minor Systems:

Inlet # 1 - Unnamed Creek

Inlet # 1 drains the low lying area on the southwest side of Rainbow Lake. The first 40 m upstream of the lake has an average wetted width of 0.8 m and an average depth of 0.15 m. The substrate consists of silts. Upstream of 40 m, the channel of Inlet # 1 flows through moss wetlands (with riparian vegetation consisting of moss, scrub birch and grasses) and becomes undefined, with many pools connected by narrow channels spreading over the area. Inlet # 1 had no fisheries potential during the survey period.

Inlet # 2 - Unnamed Creek

Inlet # 2 enters Rainbow Lake in the northwest corner, draining a low lying area. The channel has an average wetted width and depth of 0.15 m and 0.10 m respectively. For the first 20 m, Inlet # 2 flows through sedge grasses. From approximately 20 m to 40 m upstream, the channel flows through moss banks with sedge grasses, willow and scrub birch shrubs growing over. Upstream of 40 m, spruce trees also become part of the riparian vegetation. Inlet # 2 had no fisheries potential during the survey period.

Inlet # 3 - Unnamed Creek

Inlet # 3 drains the low lands on the northwest side of Rainbow Lake. The channel has an average wetted width of 1.0 m and an average depth of 0.3 m. The substrate is composed of silts and organics with grasses and Equisetum growing directly out of the stream bed, overgrowing the inlet channel. Inlet # 3 had no fisheries potential during the survey period.

LAKE: Unnamed Lake (Rainbow Lake)

Inlet # 4 - Unnamed Creek

Inlet # 4 enters Rainbow Lake on the northeast shore (Plate # 6). Over the first 50 m upstream of the lake, the creek has an average wetted width of 6.0 m and an average depth of 0.5 m. The stream bed substrate is composed of silts and organics and the channel was overgrown with yellow waterlilies (Nuphar sp.). Upstream of 50 m the inlet widens into a pond approximately 100 m long and 18 m wide. At the pond's northeast end, two narrow channels flow into the pond. Inlet # 4 had no fisheries potential during the survey period.

Intermittent Inlets

Approximately 40 seasonal or intermittent inlets are found on the south to the west shores of Rainbow Lake. A typical inlet flows for approximately 30 m before disappearing underground. On average, the seasonal inlets have wetted widths of 0.3 m and maximum depths of 0.15 m. Most of the inlets either flow through sedge grasses or across a gravel and fines beach for the first 25 m, then through low moss banks. The substrate of all of the inlets consist of silts and organics. None of the seasonal inlets had any fisheries potential during the survey period.

Outlet - Unnamed Creek

The outlet creek drains Rainbow Lake out of the southeast bay. The mouth of the outlet is approximately 1.7 m wide (Plate # 7). The first 30 m downstream has an average wetted width of 4.0 m and an average depth of 0.5 m. The substrate is composed of silt and organics with Equisetum growing out of, and overgrowing, the channel. A debris jam, found approximately 30 m downstream, has good water flow underneath it, and appears to be passable to upstream fish movement. A second debris jam (debris jam # 2) consisting of fallen trees is located approximately 55 m downstream of the lake. Downstream of the debris jam # 1, the channel flows through undercut moss banks with grasses, willows and spruce trees growing right up to the creek. The substrate composition becomes gravels and cobbles downstream of the jam. Approximately 150 m downstream, the substrate composition changes back to fines, with Equisetum growing out of the stream bed. Approximately 220 m downstream of Rainbow Lake, the outlet flows into a small unnamed lake. Throughout the length of the outlet, green algae grows commonly on rocks in the creek.

A Stream Survey card was completed for a sample site located approximately 100 m downstream of Rainbow Lake (Plate # 8 and # 9). The average wetted width is 2.6 m and the average maximum riffle depth is 0.17 m. The substrate is composed of gravels (40%), fines (10%), and cobbles (50%). The creek morphology is mainly riffles (90%) with some runs (10%), and has a gradient of 5.0%. The water temperature at the time of the survey was 18.5 °C. For additional information, refer to Appendix B.

LAKE: Unnamed Lake (Rainbow Lake)

FISHERIES MANAGEMENT COMMENTS

Rainbow Lake has a good population of large rainbow trout (fish up to 1.8 kg or 3.7 lb were captured) (Plate # 10). This lake would provide an excellent low to medium intensity fishery as there are no non-game fish present. A catch and release restriction may be suitable since tapeworms and / or cysts were found on the kidneys in 21 of the 30 rainbow trout sampled, and many fish had gill lice. The outlet creek and the creek that drains the small unnamed lake, which contain the only potential rainbow trout spawning habitat in the lake catchment, may need to be protected from angling pressure.

HISTORY OF PREVIOUS SURVEYS

Lake Surveys:

None known.

Other Related Studies:

None known.

LAKE: Unnamed Lake (Rainbow Lake)

WATER CHEMISTRY SUMMARY **Limnology Station No. 1**

Field Conditions:

Date:	August 12, 1996	Air Temperature:	18.0 °C
Time:	1350 hrs	Wind Direction:	N/A
Wind Velocity:	0-2 km/h	Surface Conditions:	calm
Cloud Cover:	9/10 o. c.	Water Colour:	clear with greenish tinge
Secchi Disc:	4.8 m		

Method Used:

Dissolved Oxygen:	YSI Model 58 Oxygen / Temperature Meter
Water Temperature:	YSI Model 58 Oxygen / Temperature Meter
Air Temperature:	Hand-Held Alcohol Thermometer
pH (field):	Digital pH Pocket Tester
H2S (field):	Hach H2S Field Test Kit
Laboratory Used:	Pacific Environmental Science Center
Water Sampler:	Vertical Alpha Water Bottle (Vandorn)
Metal Sampler:	By Hand; Preserved with 2.0 mL Nitric Acid
Substrate Sampler:	Substrate Sample Not Taken

Water Sample Chemistry: **SEAM Site No.:** E223166

	Sampling Depths	
	Surface (0.5 m)	Lower (5.5 m)
Alkalinity (lab)	214 mg/L	230 mg/L
Filterable Residue 105°C (lab)	260 mg/L	270 mg/L
H2S (field)	N/A	0.0 mg/L
Nitrogen - Total (lab)	0.28 mg/L	0.31 mg/L
Non-Filterable Residue (lab)	7 mg/L	< 5 mg/L
pH (field)	7.8	7.8
pH (lab)	8.5	8.4
Phosphorus - Total Dissolved (lab)	0.003 mg/L	0.004 mg/L
Specific Conductance (lab)	399 µS/cm	443 µS/cm

Bottom Depth: 6.7 m

Substrate Sample Depth: N/A

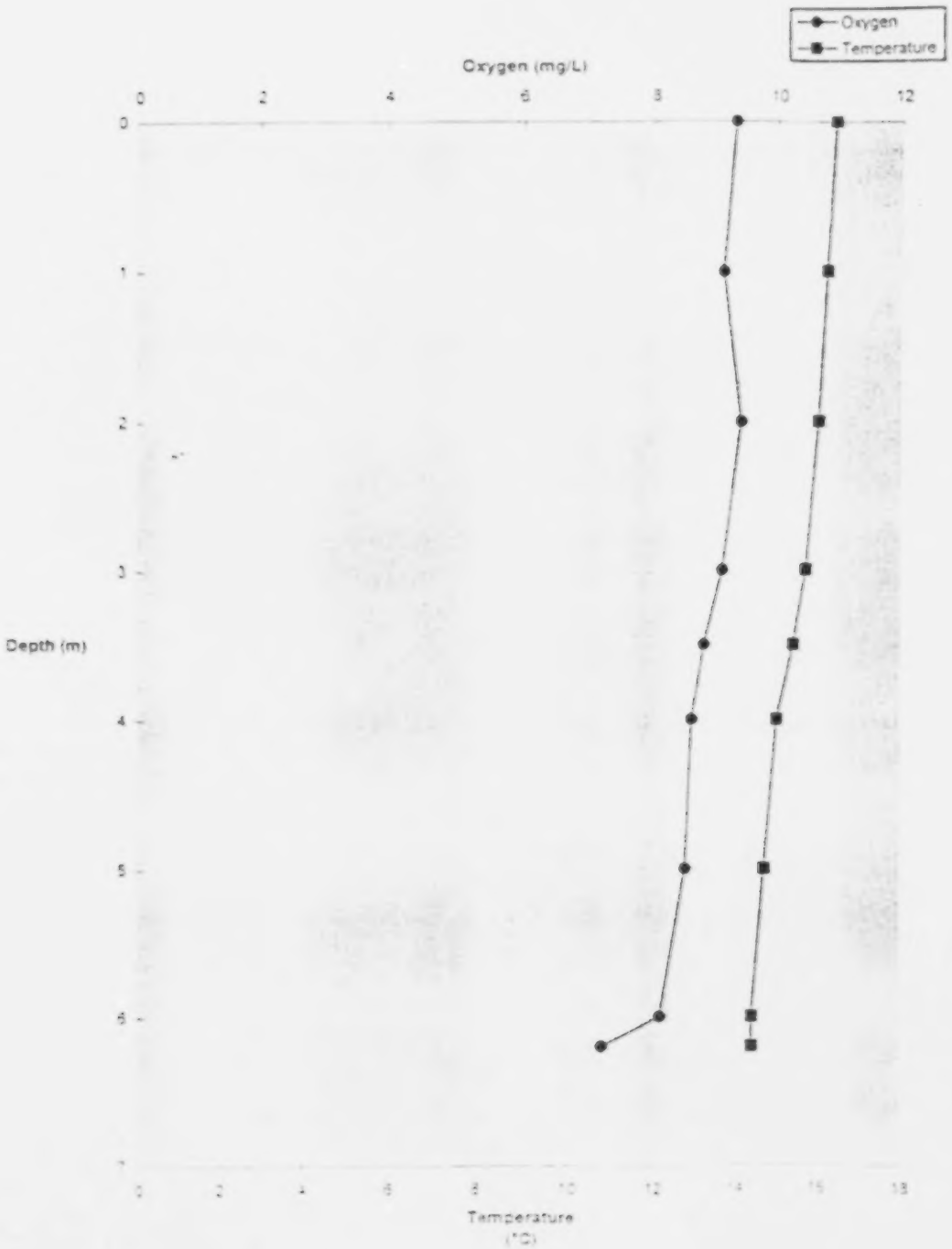
4' additional analyzed parameters and results, including metals, are found in Appendix A

LAKE: Unnamed Lake (Rainbow Lake)

SUMMER OXYGEN / TEMPERATURE DATA

DEPTH (m)	02 (mg/L)	TEMPERATURE (°C)
Surface	9.3	16.4
1.0	9.1	16.2
2.0	9.4	16.0
3.0	9.1	15.7
3.5	8.8	15.4
4.0	8.6	15.0
5.0	8.5	14.7
6.0	8.1	14.4
6.5	7.2	14.4
6.7	Bottom	

SUMMER OXYGEN / TEMPERATURE PROFILE



LAKE: Unnamed Lake (Rainbow Lake)

NETTING RECORD

Mesh Size Experimental Order: 25, 76, 51, 89, 38, 64 mm

NETTING SITE # 1

Type:	Sinking Monofilament Gill Net			
Date Set:	August 12, 1996		Time:	1115 hrs
Date Lifted:	August 12, 1996		Time:	1507 hrs
Net Dimensions:	Length:	91.4 m	Depth:	2.4 m
Shallow End Mesh Size:	25 mm		Depth:	0.8 m
			Substrate:	silts
Deep End Mesh Size:	64 mm		Depth:	5.0 m
			Substrate:	silt / clay

Comments: Gill net panels started 5.0 m out from the shore.

LAKE CATCH SUMMARY

Species	Netting Site	Angled	Other	Total	Number Sampled	Number Preserved	Size Range (cm)
RB	No. 1	0	0	46	30	0	23.5 - 51.4

MINNOW TRAPS:

Bait: Sardines

Trap No.	Hours	Depth (m)	Substrate	Species	No. Caught	Size Range (cm)
1	3:52	0.9	thick silt with yellow waterlilies	N/A	0	N/A
2	3:52	1.1	thick silt with algae covering	N/A	0	N/A
3	3:50	0.9	thick silt with yellow waterlilies	N/A	0	N/A
4	3:50	0.7	thick silt with yellow waterlilies	N/A	0	N/A

LAKE: Unnamed Lake (Rainbow Lake)

INDIVIDUAL FISH DATA

Date Captured: Aug. 12, 1996

Method: Sinking Monofilament Gillnet

M - Male
F - Female
? - Not Obvious

IMM - Immature
MG - Maturing
MT - Mature
GV - Gravid
SP - Spent
? - Not Obvious

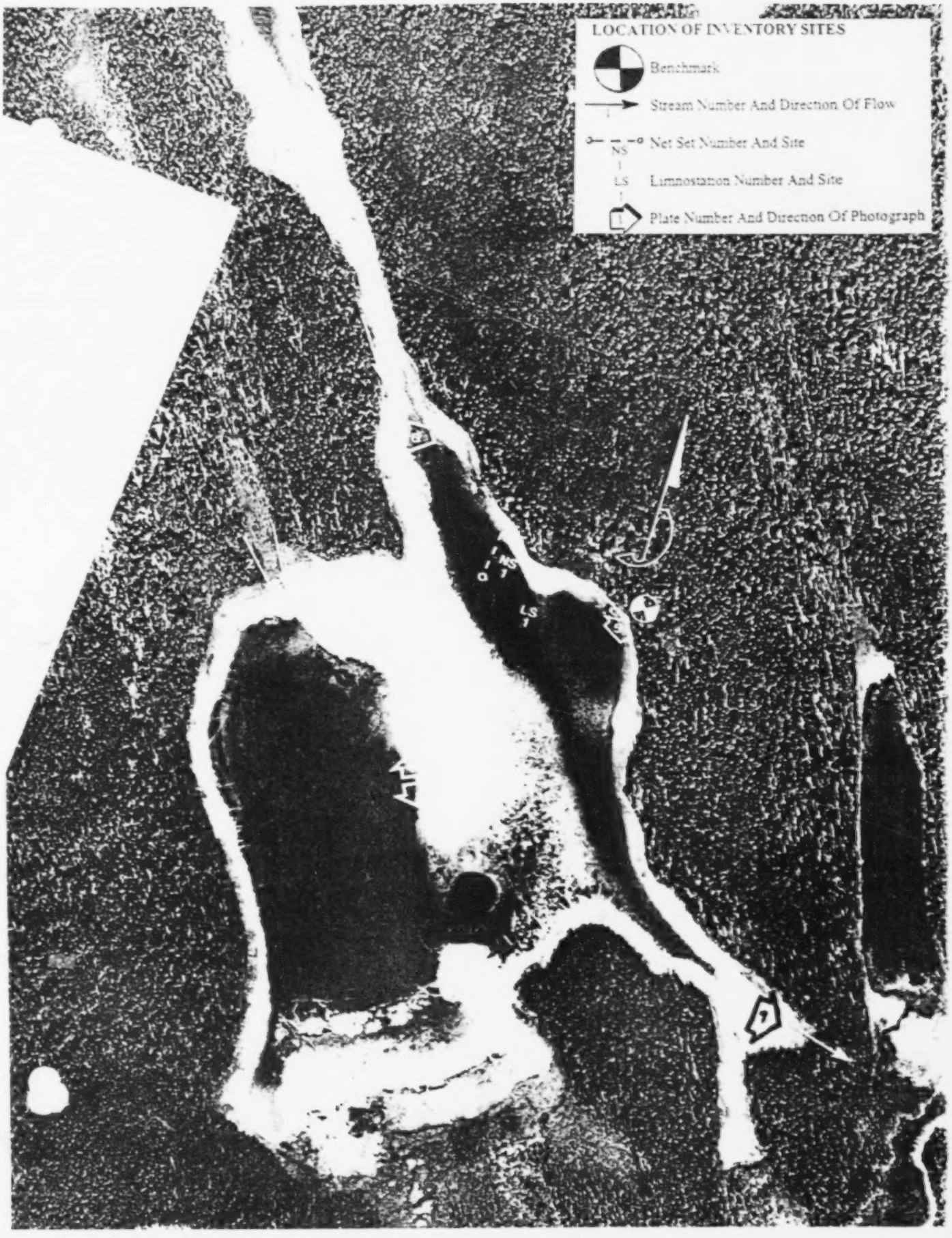
EG - Egg
FR - Fin Ray
HD - Head
ML - Milt
OT - Otolith
SC - Scale

Species	Fork Length (cm)	Weight (grams)	Sex	Gonadal Maturity	Sample Type	Age (yr)	Stomach Contents				Comments
							Plankton	Insects	Fish	Other	
RB	24.8	163	F	IMM	SC	2+	Da				
RB	26.5	210	M	IMM	SC	2+	G				
RB	39.3	685	F	MG	SC	3+	G, Da			C, S	TW on K
RB	25.0	175	M	IMM	SC	2+	Da, Cr	B			
RB	24.7	165	M	IMM	SC	2+	Da				TW on K
RB	40.6	745	F	MG	SC	3+		CL			TW on K; gill cyst
RB	27.0	220	F	IMM	SC	2+	Da				TW on K; gill cyst
RB	43.7	895	M	MG	SC	4+	G				TW on K; gill cyst
RB	30.0	308	F	IMM	SC	2+	Da, G				
RB	31.7	365	M	IMM	SC	2+	Da				TW on K
RB	39.6	698	F	MG	SC	3+	Da	CL			TW on K
RB	40.8	800	F	MG	SC	3+	G	CL		S, C	TW on K
RB	51.4	1750	M	MG	SC	7+	G				TW on K
RB	39.2	595	F	SP MG	SC	3+	G				TW on K
RB	39.6	762	F	MG	SC	3+	G				TW on K; gill cyst
RB	40.5	782	M	MG	SC	3+		CL		C	
RB	41.1	775	M	MG	SC	4+				S	TW on K
RB	38.1	635	F	MG	SC	3+	Da				TW on K; gill cyst
RB	39.2	685	F	MG	SC	3+	G				TW on K
RB	36.2	615	M	MG	SC	3+				S	TW on K
RB	38.1	682	F	MG	SC	3+		CL			TW on K; gill cyst
RB	36.6	505	M	MG	SC	4+					Empty; TW on K
RB	37.7	590	M	MG	SC	3+*	Da, G			C	TW on K; gill cyst
RB	40.2	765	F	MG	SC	3+	G			C	TW on K
RB	31.7	425	F	MG	SC	3+	G				TW on K
RB	32.1	392	F	MG	SC	2+	G				
RB	23.5	160	M	MG	SC	2+	G				
RB	23.7	154	M	IMM	SC	**		CL, B			
RB	35.3	510	F	MG	SC	3+	G				TW on K
RB	34.3	430	F	SP MG	SC	3+	G			S	

B - Beetle
C - Clams
CL - Caddis larva
Ch - *Chaoborus*
K - Kidney
Cr - Chironomids
Da - *Daphnia*
Di - Diptera
G - *Gammerus*
L - Leech
Li - Lice
O - Organics
S - Snails
St - Stomach
TW - Tape Worm
WB - Water Boatman
WF - Whole Fish

* scale is regenerated - estimated at age 3+

** scale is regenerated - no age given


LOCATION OF INVENTORY SITES
Benchmark
Stream Number And Direction Of Flow
NS
Net Set Number And Site
LS
Limnostation Number And Site
Plate Number And Direction Of Photograph
NS 1
LS 1
1

LAKE: Unnamed Lake (Rainbow Lake)

PHOTOGRAPH DIRECTORY

Plate	Roll : Number	Description
1	17: 24	Aerial view of Rainbow Lake looking southeast.
2	17: 22	Aerial view of Rainbow Lake looking northwest.
3	17:18-19	Panoramic view looking west-northwest from the centre of Rainbow Lake.
4	17: 15-16	Panoramic view looking east-southeast from the centre of Rainbow Lake.
5	17: 8	View of the benchmark located 2.0 m above the present water level in a 27 cm diameter spruce tree that is 15.2 m from the present water's edge, and located on the northeast side of the lake, approximately 250 m southeast of Inlet # 1.
6	17: 9	View of the mouth of Inlet # 4 where it enters Rainbow Lake North on the northeast shore.
7	17: 10	View of the mouth of the outlet where it drains Rainbow Lake in the southeast bay.
8	17: 5	Upstream view from the bottom of the outlet Stream Survey card sample site, taken approximately 110 m downstream of Rainbow Lake.
9	17: 4	Downstream view from the top of the outlet Stream Survey card sample site, taken approximately 90 m downstream of Rainbow Lake.
10	17:13	View of a large (51.4 cm and 1.8 kg) rainbow trout captured in Rainbow Lake.

LAKE: Unnamed Lake (Rainbow Lake North)

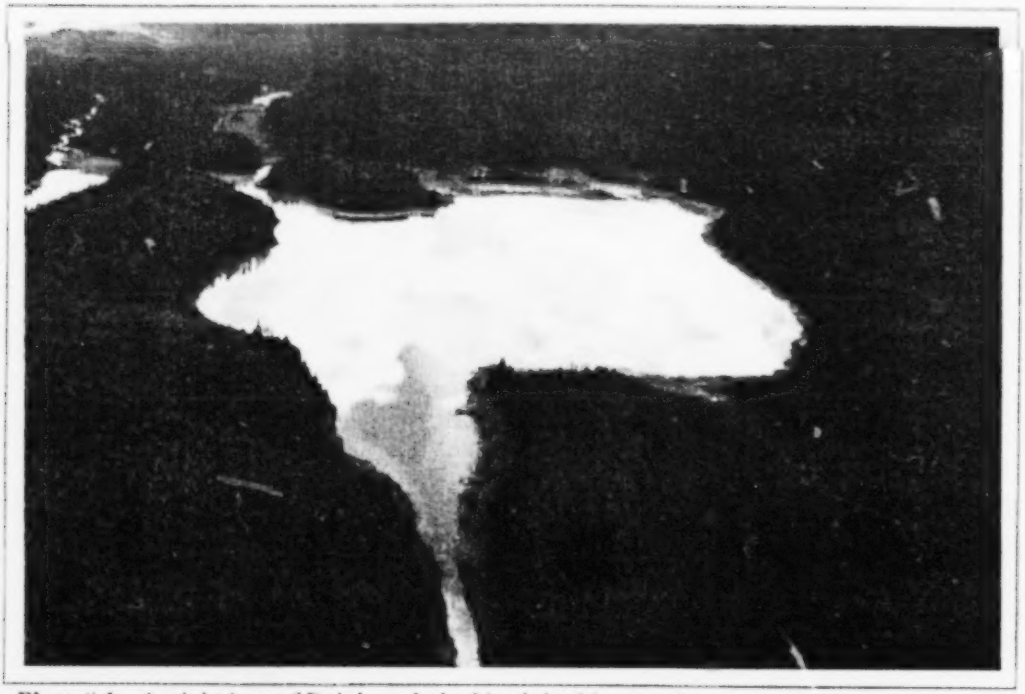


Plate # 1: Aerial view of Rainbow Lake North looking southeast.

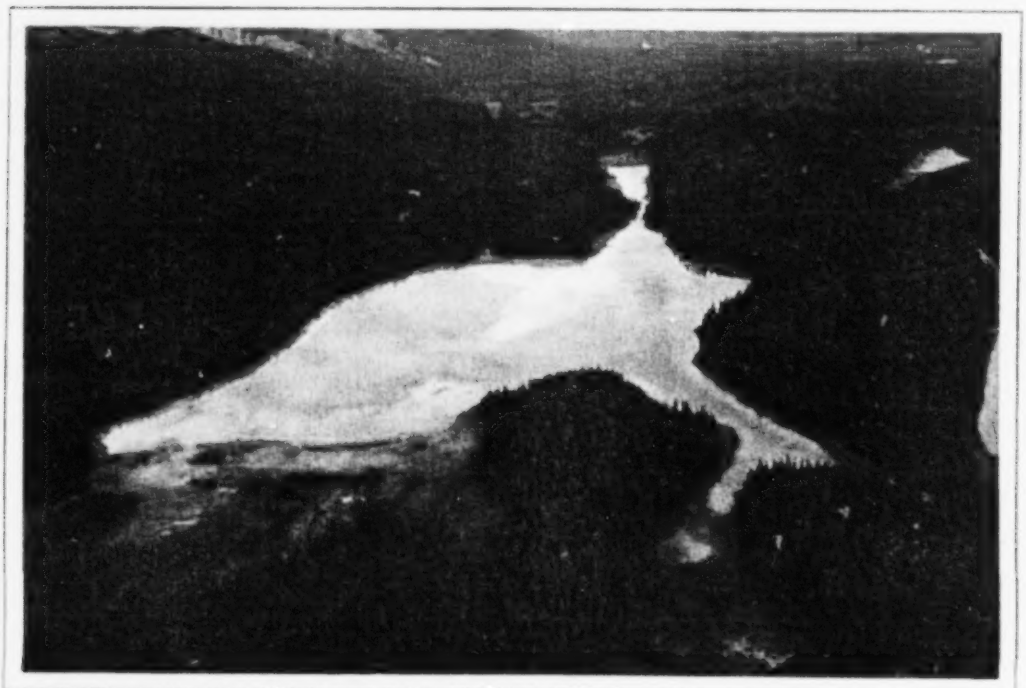


Plate #2: Aerial view of Rainbow Lake North looking northwest.

LAKE: Unnamed Lake (Rainbow Lake North)

Plate # 3: Panoramic view looking west-northwest from the centre of Rainbow Lake North.

LAKE: Unnamed Lake (Rainbow Lake North)

Plate # 4: Panoramic view looking east-southeast from the centre of Rainbow Lake North.

Plate # 5: View of the benchmark located 2.0 m above present water level in a 27 cm diameter spruce tree that is 15.2 m from the present water's edge, and located on the northeast side of the lake, approximately 250 m southeast of Inlet #1.

Plate #6: View of the mouth of Inlet #4 where it enters Rainbow Lake North on the northeast shore.

Plate #7: View of the mouth of the ~~Outlet Creek~~ where it drains Rainbow Lake North in the southeast bay.

LAKE: Unnamed Lake (Rainbow Lake North)

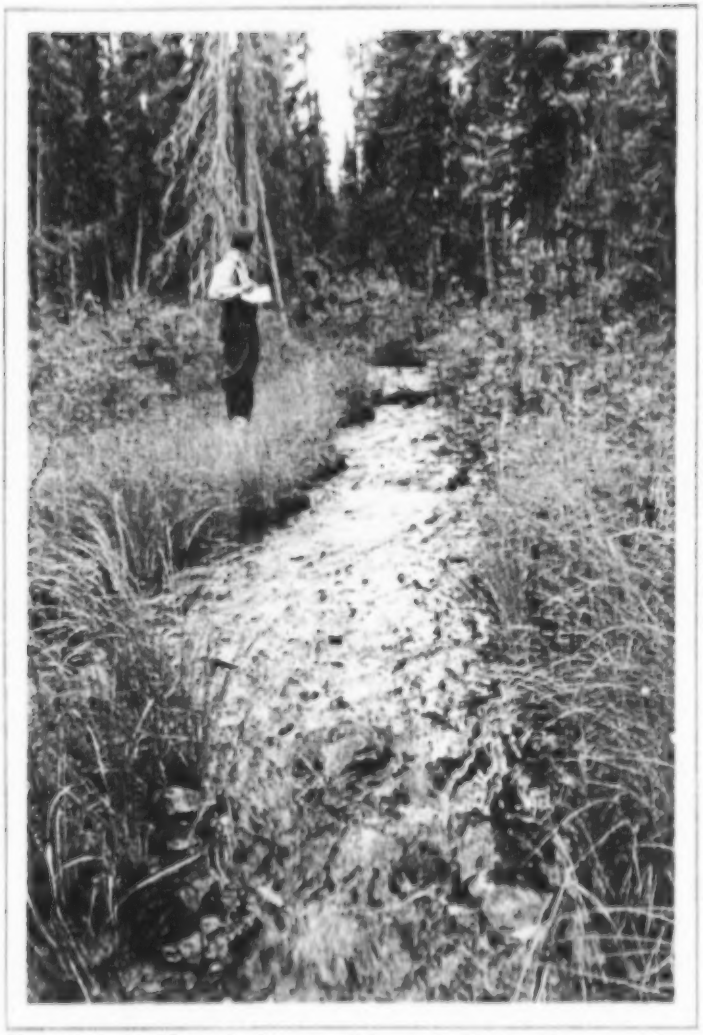


Plate # 8: Upstream view from the bottom of the outlet Stream Survey card sample site, taken approximately 110 m downstream of Rainbow Lake North.

LAKE: Unnamed Lake (Rainbow Lake North)

Plate # 9: Downstream view from the bottom of the outlet Stream Survey card sample site, taken approximately 90 m downstream of Rainbow Lake North.

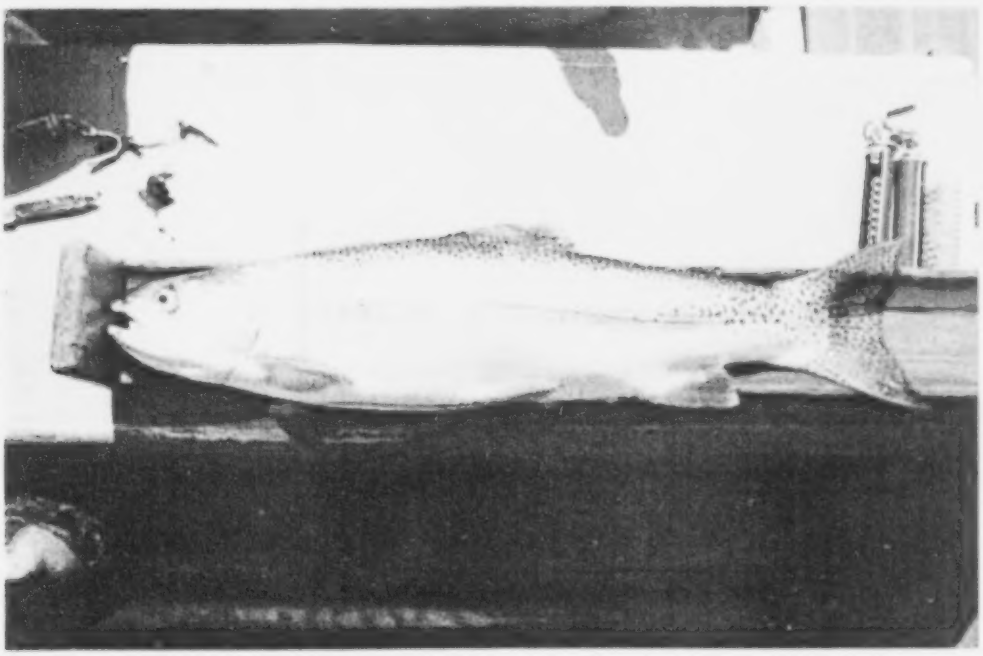


Plate # 10: View of a large (51.4 cm and 1.8 kg) rainbow trout captured in Rainbow Lake North.

Appendix A

LABORATORY REPORT

Water Chemistry Analysis

RESULTS FOR UNNAMED LAKE-RAINBOW LAKE NORTH SAMPLES

Parameter Analyzed		Units	963914-001	963914-002
ALKALINITY		mg/l	214	230
CONDUCTIVITY		uS/cm	399	443
METALS/TOTAL (WATER-ICP)	AG	mg/l	<.01	-
	AL	mg/l	<.06	-
	AS	mg/l	<.06	-
	B	mg/l	<.01	-
	BA	mg/l	.041	-
	BE	mg/l	.001	-
	CA	mg/l	32.9	-
	CD	mg/l	<.006	-
	CO	mg/l	<.006	-
	CR	mg/l	.013	-
	CU	mg/l	<.006	-
	FE	mg/l	.022	-
	K	mg/l	.7	-
	MG	mg/l	35.8	-
	MN	mg/l	.002	-
	MO	mg/l	<.01	-
	NA	mg/l	6.4	-
	NI	mg/l	<.02	-
	P	mg/l	<.1	-
	PB	mg/l	<.06	-
	SB	mg/l	<.06	-
	SE	mg/l	<.06	-
	SI	mg/l	1.98	-
	SN	mg/l	<.06	-
	SR	mg/l	.304	-
	TI	mg/l	<.002	-
	V	mg/l	<.01	-
	ZN	mg/l	<.002	-
NITROGEN/AMMONIA		mg/l	.013	.02
/NITRITE		mg/l	<.002	<.002
/NITRITE+NITRATE		mg/l	<.002	.005
/TOTAL		mg/l	.28	.31
PH		Rel.U.	8.53	8.42
PHOSPHORUS/O-PO4		mg/l	<.001	<.001
/TOTAL		mg/l	.006	.01
/TOTAL DISSOLVED		mg/l	.003	.004
RESIDUE/FILTERABLE		mg/l	260	270
/NON-FILTERABLE		mg/l	7	<5
BC CLIENT STUDY CODE			20	20
SAMPLING AGENCY			91	91
SITE IDENTIFIER/NUMBER			E223166	E223166
COLLECTION START DATE		y/m/d	96/08/12	96/08/12
UPPER DEPTH		METERS	0.5	5.5
TEMPERATURE ON ARRIVAL		deg.C	4	4

Appendix B

Tributary Stream Data

D.F.O. / M.O.E. Stream Survey Form

DFO / MOE

STREAM SURVEY FORM

Stream Name (gaz.): Unnamed Ck (local): Water to Unnamed Ck (Rainbow Ck trib) Access: FT Method:

Reach: 239 373 0 187 942

Location: ~100m DS of Unnamed Ck (Rainbow Ck trib) 94 E/S sd.1 UTM 10 321186 6822 Length/Area: 1 20

Date: 96 08 12 Time: 1340 MH KM Project: RL17.4-5 Air Photos: 30 BCB 96081-050

C	PARAMETER	VALUE	METH
	Ave Wet Width (m)	2.7	ST
	Ave Bankfull Width (m)	3.6	ST
	Ave Max Riffle Depth (cm)	17.3	DM
	Ave Max Pool Depth (cm)	—	DM
	Gradient (%)	5	SC
	Substrate (%)	90 10	GE
	Fish Cover (%)		GE
	Debris (%)		GE
	Stable %	20	GE
	COVER Total %	15	

SPECIFIC DATA

C				
		4.0	1.9	24
		3.5	1.9	24
		19	12	21

C	Substrate Code	%
	clay, silt, sand (<2mm)	10
	small (2-16mm)	15
	large (16-64mm)	55
	sm cobble (64-128mm)	15
	lg cobble (128-256mm)	0
	boulder (>256mm)	0

Pebble Count: 17 Consolidation: L (M) H

C	BANKS
1	Height (m): 0.8 Angle: 40
	Texture: (E) G L R
	Comment: EN CO FC OC (UC) N/A
	Valley Channel Ratio: 0-2 2-5 5-10 (10+) N/A
	Size: Dry L (M) H Flood
	Flood Signs (m): 0.5 Bracket: Y (N)
	Bars %: 0 Depth:
	Main Lens (%): 75 Depth:

Cover: Size Dry Bracket Depth

Cover	Do Not Use	Boulder (>256mm)	Rubble (64-256mm)	Cobble (16-64mm)	Gravel (2-16mm)	Sand (<2mm)
100%	0	10	0	30	20	40

Down Debris %: 0 F Aspect:

DISCHARGE

Parameter	Value	Method	Specific Data
Wetted Width (m)	2.0	DM	1.6, 2.4
Mean Depth (m)	0.1	DM	0.11, 0.0, 0.19, 0.12, 0.05
Mean Velocity (m/s)	0.57	F	2.3, 3.0, 5.0, 6.0, 0.2 → 3.3
Discharge (m³/s)	0.09		(2.2 × 0.75)

REACH SYMBOL (FAN)

Width (m) Channel Type Substrate Size Bed Material

Edited by

Date Edited

No.	Size Range (m)	Use

STREAM/VALLEY CROSS-SECTION (Looking Downstream)

L R

PLANIMETRIC VIEW

COMMENTS

Channel Stability — Debris — Management Concerns — Obstructions — Riparian Zone — Valley Wall Processes — Etc.

Moderate amount of woody debris around pool but not much volume

Appendix C

FISH SCALE ANALYSIS

Determination Completed By:

A.M.C. Technical Services Ltd.
Melinda M. Hirst
6809 Phillip Road.
Lantzville, B.C.
VOR 2H0

SEE ORIGINAL COPY

FOR SCALE SAMPLE READINGS

ORIGINAL COPY IS HELD BY

B. C. MINISTRY OF ENVIRONMENT, LANDS AND PARKS

PRINCE GEORGE, B. C.

Appendix D

BATHYMETRIC MAP

?

Reduced to
34%
of Original Size

STATISTICS AT TIME OF SURVEY

Elevation	870	m. ?
Surface Area	2451.66	sq.m.
Area above ice contour	2422.80	sq.m.
Volume	1806667	cu.m.
Mean Depth	1.8	m.
Maximum Depth	6.7	m.
Perimeter Main Shore	3697	m.
Perimeter, Islands	0	m.
Bench Mark	2.0	m.

Rainbow Lake